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The role of the Permanent Committee on Spatial Data Infrastructure for the Americas

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The Role of the Permanent Committee on Spatial Data Infrastructure for the Americas –PC IDEA

**A background paper for the 7th United Nations Conference for the Americas
New York, 22-26 January 2001**

Prepared by Santiago Borrero

Summary

In 1997, during the Sixth United Nations Regional Cartographic Conference for the Americas, the delegates noting and recognizing the rapid global emergence of national and regional spatial data infrastructures and its contribution to maximize the benefits of geographic information for sustainable development, recommended the establishment of a Permanent Committee for SDI/GIS Infrastructure in the Americas, reporting for consideration to the following meetings of the UNRCC- Americas.

To satisfy this requirement, this paper after presenting a brief introduction to the subject, focuses mainly on (i) the Latin American scenario, by providing essential regional background; (ii) describing the current situation of the early 2000, when, as recommend, the Permanent Committee on SDI for the Americas PC-IDEA was created; (iii) debating key aspects pertaining the need for SDI infrastructure development at the local, national, regional and global levels, and (iv) noting the situation of the Global Map initiative from the Americas perspective.

The paper concludes by presenting policy recommendations to foster development of SDI in the Americas, in the context of the role of the UN regional cartographic conferences, and a basic bibliography on the subject.

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INTRODUCTION

It can be stated that Latin America, with 17 SDI initiatives identified at the national level, is now looking seriously at the importance of having a regional spatial data infrastructure. Still as for data production, policies, seamless data and standards there is no regional integration at all, yet there are some exemptions; government budgets applied to mapping activities are, in the average, marginal and there is evident need for training and specialized education on geoinformatics. International technical cooperation has a crucial role to play in the development and sustainability of more open, advanced and integrated mapping systems in the Region.

Of course, at its own pace, Latin-American is responding to this challenge. At the Sixth UNRCC for the Americas (NY, June 1997), regarding geographic policy formulation and data production in Latin America, deliberations focused on whether the Conference is "for" the Americas or only taking place "in" the Region. Partly, as a direct result of this deliberation, it was convened to create an inter-sessional working group of experts whose task was to "re-engineer" the UN regional conferences, propose a new mission statement and agenda, incorporating issues relevant to each region and giving priority to "development of national, regional and global strategies for managing geospatial data".

The Permanent Committee was supposed to be created one year after the UNRCC in New York. However, its promotion needed additional effort. Many understood the new drivers behind the GIS/SDI orientation of the proposed committee, others were comfortable with the by then still prevailing "conventional" cartographic approach.

Experts can say that is not surprising at all. South America, a region of significant contrasts, is still mostly covered by analog maps elaborated at small scales averaging 1:500.000, with significant levels of obsolescence. In a space twice as large as Europe there are 10 national mapping organizations while in the Old Continent there are over 40. Considering that "an attitude" is today fundamental for an efficient participation in the elaboration and management of global data, one can see that the road ahead is not yet paved for initiatives like Global Spatial Data Infrastructure -GSDI, Global Disasters Information Network -GDIN or the Global Map. This is also a problem of budget and one of adaptation to the ICT revolution.

This paper faces this reality, however, with an optimistic approach to this challenge. The use of spatial information all over is growing rapidly and, though there is a limited capacity to produce and consume digital information, the region is already immersed in the technology change.

I. SPATIAL DATA INFRASTRUCTURES IN LATIN AMERICA: AN ESSENTIAL BACKGROUND

It was not the most comfortable or ideal situation, but most of the national mapping agencies were very used to analog cartographic production by the time the digital world came into the region announcing the upbringing of the Information Society. How this process is understood and managed is having an impact on the way regional spatial data infrastructures are developing. Plenty of work needs to be done, from the bottom-up and from the top-down. Professionals working in the Region still have lots

of questions and problems. It is in this context, that they will need to understand the benefits of SDI initiatives and why, concerning economic growth and sustainable development, it is essential for many of them to become internationally open and more globally oriented.

The following are key elements to understand the scenario facing the development of regional spatial data initiatives:

Contribution of the Panamerican Institute for Geography and History (PAIGH) contribution to standardization in the Americas

PAIGH, created in 1928 as a correspondent member of the Organization of American States (OAS), is located in Mexico City, the Institute provides technical assistance, training through research centers, distributes publications and supports technical meetings about cartography, geography, history and geophysics.

In spite of PAIGH financial difficulties, some distance with vanguard technologies and modern management tools, its dedication and commitment to the region as a whole, strongly influences effective execution of any strategy oriented to the formation of spatial data infrastructures in Latin America, involving its members.

Regional standards for data production and distribution are not necessary a part of the cartographic tradition in the Americas. The following are two examples, briefly presented:

1. PAIGH elaborates the "Status of Mapping in the Americas" index maps describing the availability of geospatial data through the Americas. PAIGH created in 1961 a Working Group intended to produce cartographic standards for the region. In 1968, the group approved the "Standard for Analog Cartography in Latin America". In

spite of the effort, very soon almost every mapping agency introduced significant modifications to the standard, "adjusting" it to local conditions.

2. The Interamerican Geodetic Survey (IAGS) during the 1960's introduced a program to establish for Latin America, a reference system to which all gravity anomaly surveys in the region could be referred. In 1972 PAIGH and the Canadian government joint the project and produced in 1977 an absolute datum as defined by the International Gravity Standardization Net 1971. Consequently, it was adopted as gravity reference standard for Latin America. Since then, RELANG survived under the care of Canada. It was transferred to a Latin American nation in 1982, where it experienced severe operational difficulties and in 1987 returned to Canada. However, in 1997, Canada withdrew from PAIGH and Colombia agreed to take over the responsibility for the operation and maintenance of the RELANG data base, which interconnects some 1500 stations in 22 countries.

The work of DIGSA concerning standards and data infrastructures

Created in 1978, DIGSA is the summit reunion of national mapping institutions in South America, Spain and Portugal. It is a meeting of policy-makers. DIGSA eases exchange of information between members and stimulates formation of common policy in specific areas for mutual benefit. Although DIGSA concedes priority to aspects like licensing, copyright and training policies, also digital data production, maintenance and quality are issues of its special attention.

Consequently, this Directorate also has potential to induce relevant policy regarding regional and global information infrastructures. The following are two examples for initiatives supported by DIGSA:

1. The South-American System of Geocentric Reference –SIRGAS, will be a unique geodetic reference system for South America, used also to standardize aeronautical

data. Since there are various local systems of reference, SIRGAS will eliminate existing anomalies concerning geographic position and cartographic representation among nations in the region, by providing common ground to the system of geodetic coordinates.

The methodology applied for SIRGAS will also influence regional and global data infrastructure initiatives. SIRGAS has been a teamwork project and, given circumstances, is working well. The project directly relates the use of GPS technology and spatial data, with important levels of institutional involvement and compromise.

2. The Physical Map of South-America. In 1992 DIGSA agreed to produce a digital and analog map of South America 1:5'000.000, as a first way to elaborate seamless regional data, looking also to enrich several thematic applications. In 1996 in Spain, the Map was finally delivered.

Standards, infrastructures and thematic data

As it happens in most regions, in the Americas thematic data and mapping production is commonly carried out in different places, both public and private, resulting in enormous diversification, lacking standards, with significant quality problems and incomplete documentation of data.

Of course, as happens with basic cartography, there is evident need for standards, metadata, and infrastructures for thematic applications in Latin America. These are two examples:

1. There are no standards for land classification systems. Soil surveys follow the Soils Survey Manual (1993), soil taxonomy (1998) and soil survey laboratory methods

manual, as introduced by the USDA. However, important exemption applies in the region: for instance, Mexico uses the FAO soil classification system and Brazil has its own national soil classification system. Regarding small scale information, FAO's Global and National Soil and Terrain Digital Database (SOTER) is widely used in Latin-America. Concerning soil survey classifications, most nations in the area follow the Land Capability Classification, developed in the United States, but adapted to country conditions. Colombia and Venezuela, for instance, have incorporated their own Agroecological Land Classification System and Biophysical Land Zoning Method.

2. Pertaining cadastral standard the current situation is not this advanced. Most nations do not have cadastre information structured or referenced. There are, however, important exemptions. Colombia, for example, follows the cadastre standard developed by the US Federal Geographic Data Committee, since data content is quite similar. Also, this issue is just starting to be studied within the context of subregional markets, as there is some demand for seamless data related to bordering areas and titling processes.

The Inter-American Geospatial Data Network initiative (IGDN)

IGDN was the first regional spatial data infrastructure effort for the Americas. Introduced in 1994, IGDN develops under the responsibility of the EROS data center in partnership with the USAID. As presented at the UNRCC in 1997, IGDN focuses on application of Internet capabilities in the Western Hemisphere for electronic access to information describing the existence and availability of geospatial data. IGDN, also aims to provide technology to countries in the elaboration of national and Latin-American electronic atlases and clearinghouse systems.

II. FORMATION OF THE PERMANENT COMMITTEE ON SDI FOR THE AMERICAS –CPIDEA: A report.

In 1997, during the Sixth UN Cartographic Conference for the Americas deliberations, when considering the main issues debated, the outcome was obvious:

need for spatial data infrastructures at the national, regional and global levels, global mapping requirements, diversity of new technology available and regional project needs, arising from country reports and from delegate interventions, such as the Inter-American Biodiversity Information Network -IABIN, the Inter-American Geospatial Data Network -IGDN and SIRGAS for the establishment of a unique geodetic reference system for South America.

Resolution 3 of the 6th UNRCC for the Americas recommended all member States in the Region to establish a Permanent Committee on GIS/SDI "within one year". In February 1998, taking advantage of the Working group delegates an experts meeting held in Aguascalientes, Mexico to define the mission and focus of the 7th UNRCC for the Americas, the delegates representing member states from the region established the Committee, in an *ad-hoc* manner, with Colombia elected as *pro-tempore* chair until full formalization of the committee was achieved, within the following year.

- A three years process

However, this was not an easy goal to obtain, there were several reasons: (a) The idea of spatial data infrastructures for Latin America was difficult to digest at a time when many national mapping and surveying organizations were in the level of "initial acceptances" for technology innovation, making "changes in old organizational structures"; (b) Agenda 21 was introducing the need for information related to sustainable development; (c) Specialists were in the process of redefining their own data in the digital format from a local perspective; (d) Ideas were not yet clear and nationalistic attitudes behind previous failures concerning regional standards for mapping and geodesy; (e) Poorly documented, referenced and structured data, and lack of infrastructure affecting the possibility to access, consume and disseminate digital spatial information; (f) isolation, expressed in low levels of participation at the

global level and (g) of course, the fact that most organizations were (still?) digitising old data.

Consequently, promoters of the committee started by convincing Latin-American state members about the need for harmonic spatial data infrastructure at the local, national, regional and global levels and its contribution to economic, social and environmental sustainable development. The Region evolved since then trying to overcome the above listed elements, confronted at the starting point.

-A new situation

There are several reasons behind this change: (a) The Panamerican Institute for Geography and History –PAIGH, as well as the Directorate of Geographic organizations for South America –DIGSA are involved in the promotion of enabling information technologies and spatial data infrastructures; (b) There is a wave of optimism derived from recent experiences, such as SIRGAS and the IGDN/PAIGH Electronic Atlas; (c) Numerous ongoing national SDI initiatives; (d) Growing awareness about the direct relation between information, economic growth and development; (e) Increased appetite for spatial data; (f) Need to improve spatial data availability to support better project formulation and decision-making; and, (g) The impact of regional and global initiatives like the Global Spatial Data Infrastructure and Global Map.

- How different is Latin America from other regions in the world? Results from a survey for PCIDEA

In 2000 a survey conducted by Glenn Hyman and Kate Lane (CIAT), along the lines of the one elaborated by Prof. Harlan Onsrud for FGDC. The results, among other aspects, picture the following situation in Latin America:

- GIS/SDI issues are still leaded by National Mapping Agencies, but are now challenged by other type of geographic information providers.
- There is absence of policy concerning development of national spatial data infrastructures.
- There are 17 SDI initiatives in the Region, under responsibility, in the average, of 5 national organizations.
- Industry and other type of technology providers are not yet involved in the development of these initiatives.
- Basic layers that are most frequently considered as fundamental data are: Topographic mapping; roads; land cover and land use; administrative borders; hidrography.
- There is a tendency towards cost recovery, as main factor for pricing data.
- The major constraints for consolidation of these NSDI initiatives are legal issues and funding, lack of national standards for geodata, pricing and data access.

By facing this new situation, the Americas decided to formally establish its own regional committee on GIS/SDI.

- PC-IDEA, finally, a reality

The already mentioned Resolution 3, out of the 6th UNRCC for the Americas, in addition to invite the region to form the committee, also recommended to submit reports to the UNRCC's. Consequently, the purpose of this section is to inform about the establishment of the "Permanent Committee on SDI for the Americas –PC-IDEA, as the main result out of the Seminar on Spatial Data Infrastructures and the Workshop on Metadata, organized this past February 28 to 1 March 2000, by the Colombian Spatial Data Infrastructure –ICDE and the Geographic Institute of Colombia "Agustin Codazzi" in Bogota.

Relevant support was also provided by the World Bank Infodev Program, the Center for Inter American Agriculture Technologies -CIAT, the US Federal Geographic Data Committee and the Pan American Institute for Geography and History -PAIGH. Provisional statutes were adopted and three working groups were initially organized: (a) Legal and economic affairs (Chair: Venezuela); (b) Communications and awareness (Chair: Argentina); (c) Technical aspects (Chair: Uruguay). PC-IDEA was built on the experience observed in other regions, in particular, that of Asia-Pacific. On this regard the influence of the PCGIAP documents on statutes and rules of procedure, as well as those including the terms of reference for the working groups.

It is also important to mention that there were 208 delegates representing 21 nations from North, Central and South America as well as the Caribbean Islands, including special attendees such as the Ministers of Environment from Colombia and El Salvador, the Presidents of European Umbrella Organization for Geographic Information EUROGI and PAIGH, and delegates from the USGS and the UNECA.

The Committee is formalizing relations with all relevant international organizations. The Third PC-IDEA meeting will take place in Cartagena, Colombia, May 21-25, along with the GSDI 5 Conference and the 8th ISCGM Meeting (Global Map).

- The vision of PC-IDEA: "the end of information isolation in the Americas"

The role of the Committee is essential for the development of spatial data information capabilities, at all levels, in the Americas. A recent report on worldwide spatial information trends, elaborated by IDC, demonstrated that those focusing on the use of spatial technology are growing at rates two to three times faster than companies concentrated on traditional geographic information system technology.

It is in this context that the main drivers in the Region are appealing to the work of the Committee. In the Americas we are now (a) Increasing production of spatial data

impacting R+D and sustainable development; (b) Migrating from local data to National Spatial Data Infrastructures, leading to regional spatial data sets; (c) Increasing knowledge capabilities for all members in the American hemisphere community, by incrementing access to data and information; (d) Contributing to the development of GSDI and Global Mapping capabilities; (e) Creating an Inter American forum for understanding national, regional and global GIS/SDI issues and (f) Placing geoinformation as one strategic sector for development.

III. DEBATING THE NEED FOR SDI

In every country, SDI reflects local conditions and identity. Geoinformation producers coincide on the need to develop a national spatial data infrastructure to efficiently build, share and distribute geographic data nationwide. This is the essence behind the concept of national spatial data infrastructures.

In the first stage, it is expected, results should include a definition and realization of the following:

- * Geographic metadata standard.
- * Quality standard for geographic information.
- * Standard related to Basic Geographic Object catalogue
- * Standard on terminology
- * Standard for land parcel classification
- * National recognition of the geographic sector as strategic for development
- * Increase geodata production and data-access
- * Formal approval at highest level in government
- * Tight links with other nations entities more advanced about NSDI
- * Promotion within the local geographic community
- * Incorporation of new IT to improve competitiveness
- * Develop a national network of geographic information (clearinghouse system)

To accomplish SDI objectives is not an easy task. After all, how long it is taking to those nations well immersed into SDI to reach the point in which these basic goals are obtained and performing properly and, what the costs and the amount of resources involved? If answers were available, they should be in many ways surprising and indicative about SDI possibilities for the developing world and especially poorest nations.

As in most of Africa, a good part of Asia and Eastern Europe, in South America digital mapping data is the production priority. The Region is mostly covered by analog maps elaborated at small scales averaging 1:500.000, with significant levels of obsolescence. One difference observed between those NMOs financially better off, where new or well-maintained data is digitally formatted, and the limited ones, is the trend to convert old analog maps into digital data.

Most nations in the Region, in times of the Information Technology society, still has not formally adopted a national policy concerning use of geoinformation and the ways in which it will be used to promote wealth and development. Concepts, processes and other key SDI elements are not yet clear or well defined, particularly for developing countries needs. It is a fact that those non- SDI specialists at decision-making levels find still hard to understand the real meaning and the ideas involved.

The economic cycle of ups and downs in the developing world is more unexpected and reduced in time. Growing data needs and SDI challenges are happening in a period when investment budgets, as part of downsizing programs, are reduced drastically in too many nations.

Confronting data obsolescence and data production slopes:

In many nations the cartographic production line was modernised incorporating new technology. In the following years, nonetheless, production of basic data at national level has decreased because while other geodata providers have focused on the production of data at large scales for thematic applications creating a substantial amount of new, yet not always structured data, distracting government from the production of basic information with national coverage. Also, data maintenance is now a major difficulty, leading to an increasing situation of data obsolescence.

There is a kind of paradox in all this situation. Although there is more georeferenced information available, spatial data is not really playing, at least in developing nations, its due role in the decision-making process. Moreover, because digital data can be manipulated and presented in new and "fancy" ways, there are policy-making scenarios that nowadays are impressed by the form, rather than the quality of the data.

As a result, the lesson can be that data production and SDI building in emerging economies, to be successful, a minimum level of financial and institutional sustainability.

- Embracing the SDI option

The good part about SDI is that there is almost no choice for NMA's. No matter if there are large or few amounts of digital data elaborated, because of the nature of data, after a period its length depending on local conditions, users and producers will in developing nations understands that their data must be accessible, documented, structured and reliable or, otherwise, will be practically nonexistent. As for cartography this, is like a new kind of illiteracy. Without the Infrastructure, there is isolation. Analog map production was to the old national mapping authority, the reason for production monopoly, as digital data today is to the need for spatial data infrastructures.

In this market, of many data producers and demanding users, national mapping authorities have a new role, beyond data production, as coordinators and facilitators of this process. There is need to optimize the use of limited funds and to assure data quality and opportunity. The development of national SDI's is the way to benefit from this new and powerful situation. It will have a significant impact in national development.

This is why, when confronting this situation, a choice between data production or infrastructure development, the most successful are those nations that selected both. In addition to the basic institutional goal (to produce, analyse and make available data for various purposes), the current one gives the same priority to the design, promotion and setting up of SDI.

Developing nations must be aware about the need to expand their knowledge base. To achieve this goal emerging societies should look to all the information accumulated by the leading economies. This knowledge can be incorporated via international cooperation, technology licensing or foreign investment. Although it may be the decision of multilateral organisms to promote data sharing, in the end it is data owners right to decide "what data share". Nonetheless, about "how to share" data, this is also responsibility of the recipient, since the connecting dimension requires or will be optimized if spatial data infrastructure conditions are available.

Policymakers everywhere make relevant decisions without full information, yet in developing nations, due to chronic absence of key geodata, risks taken are even higher. At the highest level in government, not enough work is being done regarding the consequences of new space imaging technologies and applications, the renewed role of geoinformation and the way data sets can best be institutionally organized and used to efficiently address economic, social and environmental strategic issues.

- Multi/bilateral cooperation, International Geographic Organizations and the promotion of SDI

In many aspects the SDI initiatives can move forward without support from the main multilateral organization. This could be the case of standards and metadata production. In others, for example "making SDI benefits accessible to all nations", as stated in resolution and declarations, more direct involvement and policy formulation seems essential. These organisations are and will be highly influential in developing nations and the need for a more clear endorsement pertaining SDI is essential.

As for the UN system, the situation was studied during the 1997 UNRCC for The Americas, concluding later with a proposal for the creation of a UN Permanent Geographic Information Commission and the need to re-engineer the Regional Cartographic Conferences, elaborated by the 1998 Special Working Group reunited in Mexico. The main issue still remains and that is how the UN will move from actual recognition of SDI relevance to a more practical level of involvement in spatial data infrastructure promotion. For instance, United Nations support appears vital to facilitate regional participation and access of developing countries to already available key spatial data.

Also, The World Development Report of 1998/99 called for the World Bank attention on the ICT impact, in the context of the following policy: (1) developing nations must include policies to narrow the knowledge gap, (2) all parties must work together to strengthen the institutions needed to address information problems and (3) knowledge is at the core of any development effort. The Report states that "developing country governments, bilateral donors, multilateral institutions, nongovernmental organizations and the private sector must work together to strengthen the institutions needed to address information problems". Otherwise, there is a higher risk:

information capacity in globalization is raising the danger that "the poorest countries and communities will fall behind more rapidly than ever before".

On the other side, the role of bilateral cooperation and that of international geographic organizations should also focus its agenda on the need to support this "information for all " scheme, by promoting SDI activities in the emerging Regions, including spatial data production, delivery mechanisms and metadata standards.

One most important way to understand the many benefits derived from SDI is, evidently, by practicing it. At this stage of development, SDI is also an educational process ("working locally but acting globally"). Concerning the various elements involved in SDI, as for the developing nations, currently there is more training than education. This issue should be highly relevant when considering technical assistance as part of multi/bilateral cooperation agreements or when defining the agenda for the different education commissions, acting as part of the international geographic organizations. Many cases studies are showing in the developing world the existence of a tremendous gap between technology tools available and poor levels of use, to some extent, due to low availability of specialized human resources and the quality of technical assistance. Information infrastructures are the entranceway to non-limited possibilities for progress and democracy.

IV. A practical example: PC-IDEA, the availability of fundamental data for the Americas and the Global Map initiative

The concept and the processes by which Spatial Data Infrastructures (SDI) are built today are essential part of Geography around the world. The way data is being produced, organized and analyzed from local to global levels and vice versa, through initiatives like Global Map (GM), one of the pioneers in this field, results in a broad and dynamic exchange of ideas, methods, better understanding of diversity, all in sum, impacting the way territorial planning and sustainable development are pursued.

In the Americas, for the benefit of the Region and its members, PC-IDEA intends to be mature enough in a short period of time in order to play its due role in GM development and take advantage of its application. As described later on this paper, already GM Phase 1 contributes meaningfully, by increasing the amount and quality of seamless data available, without restraints, in the Americas.

There is a direct relation between PC-IDEA and Global Map.

On one side, the above mentioned 6th UNRCC for the Americas Resolution 6 on "Development of the Global Map" recommends the *"strengthening of existing efforts and the establishment of new initiatives between global mapping and various national and regional spatial data infrastructures"*.

On the other, there are the main drivers for PC-IDEA already mentioned. PC-IDEA expects to significantly stimulate the production and use of new and more powerful data sets, is the case of GM, by regional organizations and decision-making entities. Also, PC-IDEA can contribute to increase the level of participation in GM, taking into consideration that nine countries involved in PC-IDEA are not in the GM project, whilst Cayman Islands, Bermuda, Holland Antilles and Cuba are participating in GM and not yet in PC-IDEA.

-Global Map and the availability of Fundamental Data for the Americas

The situation concerning the status of seamless reference data for the Americas, available without restraints, as presented in the most recent report on "Status Maps for Cartography and Geodesy in the Americas", produced by PAIGH's Commission on Cartography (1997), concerning intermediate and small scales, can be resumed as follows:

- Regarding topographic and planimetric maps, total and homogenous coverage can only be observed in North America. A diversity of scales and partial coverage, especially in the Andean countries and the Caribbean Islands, is found in the rest of the continent. As well, a similar but more dramatic situation is observed when looking at the production of digital maps.
- Image map production is relevant in North America. There is national coverage available for Mexico, Venezuela, Guatemala and Panama. An increasing production is observed in other areas. This is the case, for instance, of Central America where this type of product is used in the recovery phase out of the hurricane "Mitch" natural disaster.
- As for vertical geodesy, coverage using conventional technology is significant for first order leveling, though there is not updated information when considering GPS based geodesy. In any case there are relevant areas, such as the Amazons, where there is not information.
- There are thematic charts covering the continent at scales ranging from 1:100.000 to 1:1.000.000. This is the case for hydrographic (including bathymetry) and aeronautical charts (Figure 2).

This few elements easily lead to the conclusion about the need for improved and accessible framework data for the Americas. Precisely, this is one of the core responsibilities for PC-IDEA and relevant work is in progress, trough the Technical Working Group (Fundamental Data Sub Group). When dealing with the issue of reference data there is global common ground but there are also relevant differences, especially when considering regional characteristics. Based on the draft document "Fundamental Data" (PC-IDEA, 2000) available for consultations by country members, differences with GM Phase I are located only in the incorporation of a layer for geodesy.

More relevantly, when defining GM Phase 2, differences may vary greatly as initial contributions from PC-IDEA members call for consideration of additional thematic data layers such as bathymetry, various biodiversity indicators and cadastral information, including specific aspects like Indian reservations, state parks and natural reservations. Though these motivations are related to the existence of different points of view based on cultural and geopolitical aspects, they all may enrich GM Phase 2 in its conceptualization and development stages. In any case, it is in the interest of PC-IDEA to contribute to GM vision, given the need to enhance accuracy and completeness of fundamental data for the Americas. In times of information infrastructures development, needs to reduce duplication and other cost efficiency considerations, at PC-IDEA there is understanding about the relevance of this type of data sets, in particular, because they will be accessible, documented, well structured and reliable.

-Global Map applications: The impact on project formulation and Decision-Making in the Americas

During the mentioned 6th UNRCC for the Americas, when considering the resolution to be adopted on establishment of a permanent committee on GIS/SDI issues for the Americas, the reasons mentioned by the delegates went beyond the need for a regional forum to share experiences, consult on matters of common interest or develop a regional geographic information infrastructure, behind the idea really was the need to maximize the economic, social and environmental benefits derived from geographic information.

To obtain these ambitious goals, PC-IDEA must be efficient in terms of placing new data sets for improved regional project formulation and decision-making. For instance, regardless of its economic and social short-term feasibility, a visionary mega project like IFSA, aiming at integration of main rivers in South America, is

affected by the lack of seamless multinational geographic information (CIFSA, 1999). GM will allow these kind of initiatives to advance.

Indeed, the availability of this information in a region used to a national interpretation of the Americas territory, will impact for the better the works of many regional organizations. In other words, if GM was conceived to facilitate implementation of agreements and conventions related to environmental protection, disaster mitigation and the promotion of growth in the context of sustainable development (ISCGM, 1999), there is no doubt that the main sub regional economic agreements will soon exemplify the benefits of this project.

In fact, as the majority of the decisions and in particular those market-related has a geographic dimension or are georeferenced, international agreements such as the Central American Common Market (MCCA), the Andean Community of Nations (CAN), Caribbean Community (CARICOM), among others, will immediately benefit from GM as they have requested this information for years.

Moreover, within the context of GM definition, a look at the Americas continent and the particularities observed in the various sub regions, and should induce or make evident the need for a GM Phase 2:

- The lack of appropriate seamless spatial information is directly related to the possibility to improve quality in the decision making process, concerning prevention and mitigation policy related to natural disasters. This is the case, for instance, of the South American Pacific coast in relation to "El Niño" phenomena and Central America regarding the social and economic impact of hurricanes every year.
- Tropical soils, covering 50% of South American productive lands, are affected by serious fertility limitations derived from conventional agriculture

practices. There is need for multinational spatial information related to viability of treatment options, eventually leading to increments in their productivity.

- o Many of the mega diversity nations are located in South America, owning rich ecosystems of enormous biological importance. More consistent spatial information, leading to comprehensive analysis is required to conceive improved protection and adequate management policies.

V. THE FUTURE: Recommendations for Action

In view of the need for action addressed to accelerate SDI processes in the Region, the following actions are recommended:

1. Develop UN policy, by which the UN agencies and the state members, involved in the development of spatial data projects, promote national and regional sound and harmonic data infrastructures.
2. Promote the work of the Permanent Committee on Spatial Data in the Americas - PC IDEA
3. Implement training and educational activities in the context of SDI development, including specific applications related to the use of satellite imagery.

Not much work is being done in the region regarding consequences of new space imaging technologies and applications, for instance, economic and social benefits for developing nations. An exemption can be the work of SELPER, the regional ISPRS branch, as part of the preparations for UNSpace 1999. However, presentation of these issues is quite fragmented and without coherence

4. Re-engineer key aspects of the UNRCC. The situation was studied during the UNRCC Special Working Group meeting in Mexico, concluding with a proposal for the creation of a UN Permanent Geographic Information Commission. Recalling content of Resolution 2 from the 1997 UNRCC for the Americas, re-engineer also means allowing bench-marking and comparison of achievements and strategies concerning surveying, mapping, cadastral and GIS activities, and providing policy support to governments and UN system, focusing on how spatial data infrastructures can contribute to better decision-making on issues relevant to local, national, regional and global sustainable development

5. Support the works of the United Nations Geographic Information Working Group. This is the first UNRCC where this issue of importance for the UN system and the State Members can be jointly studied.

6. Obtain a more clear statement and compromise from the international geographic organizations attending UNRCCs, concerning SDI. The recent Asia-Pacific UNRCC deliberated on the subject with relevant participation from FIG and ICA. It is noted the way FIG is increasing its presence in Latin America.

7. Support specific NSDI and RSDI related pilot projects, in particular pertaining spatial data production, delivery mechanisms and metadata standards.

8. Elaborate an inventory of global data sets and initiatives. Already there are too many not really efficiently integrated global projects, related to spatial data causing a need for a more clear vision and goals.

9. Support a regional Workshop on Institutional Development and Capacity Building for National Mapping Agencies in the context of new Information and Communication Technologies and SDI.

It is a fact that these changes are impacting these organizations, not only in terms of reviewing its main functions and mission as producers of fundamental data and the need for capacity building to take advantage of these developments, but regarding the economic externalities each society can derive from this information (Groot, 2000).

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